

# Notice of Allowability

Application No.

09/590,464

Examiner

Wesley D Markham

Applicant(s)

THAKUR, RANDHIR P. S.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to amendment of 3/8/2004.
2. ☒ The allowed claim(s) is/are 20-22, 24, 25, 30, 53, 57, 61-67, 70-72 and 75-79.
3. ☒ The drawings filed on 09 June 2000 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All    b) ☐ Some\*    c) ☐ None    of the:
  1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
  6. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
    - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
      - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
    - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

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## **DETAILED ACTION / ALLOWANCE**

### ***Response to Amendment***

1. Acknowledgement is made of the amendment filed by the applicant on 3/8/2004 (with a certificate of mailing dated 3/5/2004), in which Claims 20, 53, 57, 61 – 67, 70, 71, and 75 were amended, and Claims 50 – 52, 54, 55, 58, 68, and 73 were canceled. Claims 20 – 22, 24, 25, 30, 53, 57, 61 – 67, 70 – 72, and 75 – 79 are currently pending in U.S. Application Serial No. 09/590,464, and an Office Action on the merits follows.

### ***Drawings***

2. The drawings (4 sheets, 4 figures) filed by the applicant on 6/9/2000 are acceptable.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. The rejection of Claims 20 – 22, 24, 25, 30, 50 – 55, 57, 58, 61 – 68, 70 – 73, and 75 – 79 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, set forth in paragraph 8 of the previous Office Action (i.e., the non-final Office Action mailed on 10/6/2003), is withdrawn in light of the applicant's amendment and remarks which clarify that the claimed "thermal light energy" is light

energy that actually heats the layer/substrate (i.e., to a temperature sufficient to anneal the layer – see amended independent Claims 20 and 75).

***Allowable Subject Matter***

5. Claims 20 – 22, 24, 25, 30, 53, 57, 61 – 67, 70 – 72, and 75 – 79 are allowed.
6. The following is an examiner's statement of reasons for allowance: The claimed invention, as embodied by independent Claims 20 and 75, is drawn to a process for forming layers in electronic devices. The process generally comprises placing a substrate / semiconductor wafer in a cold wall reaction chamber; pulsing a precursor fluid into the reaction chamber, the precursor fluid forming a solid layer on the substrate / wafer; purging the reaction chamber after each pulse of precursor fluid by flowing an inert gas through the chamber to substantially remove any precursor fluid not converted into a solid; and, for multiple or selected times during formation of the layer, annealing the solid layer by exposing the layer to thermal light energy, the light energy heating the solid layer to a temperature sufficient to anneal the layer, the exposure taking place after the reaction chamber is purged by the inert gas and prior to the next pulse of the precursor fluid (e.g., between pulses of the precursor fluid and after cooling by the inert gas flow). A summary of the closest prior art of record follows. Nishizawa et al. (USPN 5,443,033) and Utsumi et al. (USPN 5,495,822) both teach pulsed precursor vapor deposition processes in which intermittent UV light exposure is utilized to cause a photochemical reaction / excitation and/or reduce the growth temperature. However, neither reference teaches or reasonably

suggests that the light energy is "thermal light energy" that heats the solid layer to a temperature sufficient to anneal the layer, the light energy exposure taking place after the reaction chamber is purged by an inert gas and prior to the next pulse of the precursor fluid. In fact, Nishizawa et al. explicitly teaches that the light reduces the growth temperature, and Utsumi et al. explicitly teaches that no temperature rise is caused by the UV light exposure. DiMeo, Jr. et al. (USPN 5,972,430) broadly teaches a pulsed precursor vapor deposition process in which additional activation means (e.g., UV light activation) can be used along with thermal activation means. However, the process steps and sequence claimed by the applicant, including annealing the solid layer by exposing the layer to thermal light energy, the light energy heating the solid layer to a temperature sufficient to anneal the layer, the exposure taking place after the reaction chamber is purged by the inert gas and prior to the next pulse of the precursor fluid, are not reasonably taught or suggested by DiMeo, Jr. et al. Schachameyer et al. (USPN 4,670,063) teaches a vapor deposition process in which a single precursor gas is continuously introduced into a chamber to form a semiconductor layer, and, during the growth process, UV light is pulsed into the chamber to periodically heat and anneal the layer. However, the process of Schachameyer et al. is not a pulsed precursor process (as claimed by the applicant), and Schachameyer et al. does not teach or reasonably suggest performing the process steps (e.g., pulsing, purging / cooling, annealing, repeating) in the manner claimed by the applicant. As such, the prior art of record, alone or in combination, does not teach or reasonably suggest each and every limitation of Claims 20 and 75,

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and these claims are allowed. As claims 21, 22, 24, 25, 30, 53, 57, 61 – 67, and 70 – 72 depend from Claim 20 and Claims 76 – 79 depend from Claim 75, these claims are also allowed.

7. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (571) 272-1415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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